

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: SHINGAGAWA, Tsutomu et al. Conf.:
Appl. No.: New Group:
Filed: February 13, 2002 Examiner:
For: PHOTOMASK BLANK, PHOTOMASK AND METHOD OF
MANUFACTURE

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, DC 20231

February 13, 2002

Sir:

The following preliminary amendments and remarks are respectfully submitted in connection with the above-identified application.

IN THE SPECIFICATION:

Please replace page 10 with the new page 10 attached hereto.

REMARKS

Entry of the above amendments is earnestly solicited. The amendment merely corrects an obvious typographical error which is readily apparent to one of ordinary skill in the art. An early and favorable first action on the merits is earnestly solicited.

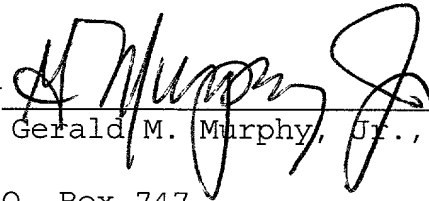
Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By



Gerald M. Murphy, Jr., #28,977

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

GMM/cqc
0171-0819P
Attachments

(Rev. 12/19/01)

thick was deposited by DC sputtering a target of metallic chromium in an atmosphere of a mixture of 73 mol% of Ar, 5 mol% of CH₄, 5 mol% of O₂ and 17 mol% of N₂ as the sputtering gas, and under conditions including a gas pressure of 0.2 Pa and a power of 250 W during discharge. This CrCON film was analyzed by ESCA to find a composition consisting of 75 at% Cr, 8 at% C, 12 at% O and 5 at% N. By subsequent sputtering in an atmosphere of a mixture of 40 mol% of Ar, 20 mol% of CH₄, 20 mol% of O₂ and 20 mol% of N₂ as the sputtering gas, a CrCON film of 30 nm thick was deposited. The overlying CrCON film was analyzed by ESCA to find a composition consisting of 42 at% Cr, 5 at% C, 30 at% O and 23 at% N. The results are shown in Table 1.

The optical properties of the uppermost surface of the CrCON film was examined. Specifically, a reflectance at a wavelength of 436 nm was measured at intervals of 5 nm by means of NANOSPEC, finding a variance D of 0.23.

Table 1

		Example 1				Comparative Example 1			
		Film composition (at%)				Film composition (at%)			
		Cr	C	O	N	Cr	C	O	N
Light-shielding film	CrCON	76	3	16	5	75	8	12	5
Antireflective film	CrCON	44	9	34	13	42	5	30	23
Variance of reflectance @450 nm		0.032				0.23			

Next, the photomask blanks prepared in Example 1 and Comparative Example 1 were etched in a pattern. The shape in cross section of the pattern was observed. A substrate-adjoining film having a lower carbon content led to a better shape because of a nearly perpendicular inclination angle. Also the use of carbon dioxide gas resulted in a smooth cross-sectional shape.

thick was deposited by DC sputtering a target of metallic chromium in an atmosphere of a mixture of 73 mol% of Ar, 5 mol% of CH₄, 5 mol% of O₂ and 17 mol% of N₂ as the sputtering gas, and under conditions including a gas pressure of 0.2 Pa and a power of 250 W during discharge. This CrCON film was analyzed by ESCA to find a composition consisting of 75 at% Cr, 8 at% C, 12 at% O and 5 at% N. By subsequent sputtering in an atmosphere of a mixture of 40 mol% of Ar, 20 mol% of [CH₂]CH₄, 20 mol% of O₂ and 20 mol% of N₂ as the sputtering gas, a CrCON film of 30 nm thick was deposited. The overlying CrCON film was analyzed by ESCA to find a composition consisting of 42 at% Cr, 5 at% C, 30 at% O and 23 at% N. The results are shown in Table 1.

The optical properties of the uppermost surface of the CrCON film was examined. Specifically, a reflectance at a wavelength of 436 nm was measured at intervals of 5 nm by means of NANOSPEC, finding a variance D of 0.23.

Table 1

		Example 1				Comparative Example 1			
		Film composition (at%)				Film composition (at%)			
		Cr	C	O	N	Cr	C	O	N
Light-shielding film	CrCON	76	3	16	5	75	8	12	5
Antireflective film	CrCON	44	9	34	13	42	5	30	23
Variance of reflectance @450 nm		0.032				0.23			

Next, the photomask blanks prepared in Example 1 and Comparative Example 1 were etched in a pattern. The shape in cross section of the pattern was observed. A substrate- adjoining film having a lower carbon content led to a better shape because of a nearly perpendicular inclination angle. Also the use of carbon dioxide gas resulted in a smooth cross-sectional shape.